

CLAIMS

What is claimed is:

1. A transport to microwave radio frequency adapter that accepts an input telecommunications transport signal on an input port and converts information in such signal to a desired microwave Radio Frequency (RF) carrier, the input transport signal carrying information at an input bit rate, the apparatus comprising:
 - a phase encoder, coupled to receive the transport signal, the phase encoder implementing a Phase Shift Keyed (PSK) encoding such that at least first phase is selected to indicate a first logical value for an input data bit in the transport signal and a second phase is selected to indicate a second logical value for an input data bit in the transport signal, the deviation between the two phases selected to be equal to a predetermined value;
 - a local reference oscillator, connected to provide a first microwave carrier;
 - a frequency multiplier, connected to receive the output of the local reference oscillator and to multiply the output thereof to a desired microwave RF carrier frequency; and
 - a phase modulator, connected to impart a direct phase modulation to the microwave RF carrier.
2. An apparatus as in claim 1 wherein the telecommunications transport signal is provided on an optical physical medium.
3. An apparatus as in claim 2 additionally comprising:

an optical-to-voltage transducer connected to receive the telecommunications signal and to provide a baseband electrical signal at an output.

4. An apparatus as in claim 1 wherein the frequency multiplier implements a multiplication factor.
5. An apparatus as in claim 4 wherein the frequency multiplier is implemented in a plurality of frequency multiplication stages.
6. An apparatus as in claim 1 wherein the phase modulator and frequency multiplier perform a direct phase conversion of the input transport signal to the microwave RF carrier.
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7. An apparatus as in claim 6 wherein the direct conversion is performed without using the input transport signal to modulate an intermediate carrier signal.
8. An apparatus as in claim 1 additionally comprising:
 - 15 a microwave bandpass filter connected to the output of the frequency multiplier to filter harmonics of the carrier frequency of the voltage-controlled oscillator.
9. An apparatus as in claim 1 additionally comprising:
 - 20 a microwave RF to transport adapter, to convert a received microwave RF signal to a transport signal carrying an output telecommunications transport signal.
10. An apparatus as in claim 9 wherein the microwave RF to transport adapter further comprises:

an oscillator, operating at a carrier frequency which is a predetermined fraction of a desired direct down-conversion frequency;

5 a frequency multiplier, connected to receive the oscillator output, and to multiply the oscillator output up to the desired direct down-conversion frequency; and

a mixer, coupled to the frequency multiplier and the microwave RF signal, to provide a down-converted transport signal.

11. An apparatus as in claim 1 wherein the phase modulator implements a sub-phase deviation phase shift prior to the frequency multiplier.
- 10 12. An apparatus as in claim 11 wherein the sub-phase deviation phase shift is equal to an output desired phase shift divided by a frequency multiplier factor implemented by the frequency multiplier.
13. An apparatus as in claim 1 wherein the phase modulator implements a phase deviation after the frequency multiplier.
- 15 14. An apparatus as in claim 13 wherein the phase modulator imports a direct phase shift to the microwave RF carrier.